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by the natives, are now unnecessary on account of the visits of traders to both shores, and are seldom or never undertaken. The Diomedé people, however, visit both shores and carry liquor from Asia to America. The increasing scarcity of food is impelling a southward migration as previously mentioned, and it may not be many years before the native Eskimo population of Asia may be located where Lieut. Nordqvist at present has somewhat prematurely placed them, namely, to the south and west of Cape Chukotsky.

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THE LENGTH OF LIFE OF BUTTERFLIES.¹

BY W. H. EDWARDS.

SOME inquiries on the subject led me to investigate the matter, and to refer to my note books, in which are recorded everything that has come under my observation relating to butterflies for the past fifteen years.

Boisduval, and Kirby, and Spence allege that the life of the summer butterflies is brief, the male expiring soon after copulation, the female after oviposition. On the other hand, Mr. Scudder has spoken of butterflies living two to three months. Mr. Edwards expressed the opinion as to the hibernating butterflies, that they lived from about the 1st of September to the end of the following May, or eight to nine months at the outside. Whereas Mr. Scudder asserts that *D. archippus* lives from a year to fifteen or sixteen months.

Observations show that one brood follows another in rapid succession in many species at the South, a month sufficing for the complete duration of the generation. As the emergence of individuals from the chrysalis is not all at once, but is continued through several days or weeks, it follows that the life of any individual butterfly must be much less than the duration of its generation; certainly not over one-half to two-thirds that of the generation. In the case of polymorphic species like *Papilio ajax*, it is not difficult to fix the duration with some definiteness. Mr. Edwards gave from his note books dates of the first and last appearance at Coalburgh, W. Va., of the form *Ajax walshii* and of the form

¹ Abstract of a paper read at the Cincinnati Meeting of the American Association for Advancement of Science.

Ajax telamonides, and showed that an individual life could hardly be more than two to three weeks. It was stated that not only in this species but in most or all which had come under observation, it is the old males which mate with the young female as soon, or nearly as soon, as she emerges from the chrysalis. These old males are on the watch, flying about everywhere, and seize the young female, often before her wings are dry, and hence before the young male, if emerging at the same time with the female, would be strong enough to take part in the copulation. Consequently it happens that many of the males are unable to find mates, and these males are the longest lived. The last butterflies of the generation are often seen to be old males, who probably have never mated.

Similar conclusions as to the duration of life were drawn from observations on the polymorphic species, *Lycæna pseudargiolus* of which *L. violacea* is the early form.

For an example of the hibernating species, the history of *D. archippus* was detailed. It is three or four brooded in West Virginia; the old females die in May after laying their eggs. These eggs produce the first generation of butterflies of the year, and the females of this lay eggs which produce the second generation, and so on to the end. The eggs are always laid by females plainly not long from the chrysalis. We have carefully watched this species all through the year 1878, and had given the results as briefly stated here in *Psyche*, Dec., 1878. This was because Mr. Scudder, in *Psyche*, July, 1875, had represented Archippus as having habits unlike any other butterfly, in that it was single-brooded over North America, and not double brooded; that it left its winter quarters late and continued on the wing the rest of the season, laying eggs all the time, so that the caterpillars to be found all along through the season were produced by its eggs, *instead of coming from the eggs of young females*. The young females in fact could not lay until they had passed hibernation. It will be seen that such behavior involves a radical change of habits of the race, wherein this butterfly, laying eggs at intervals for months, approaches the mammals.

Mr. Scudder recently repeats this story in his "Butterflies," 1881, without note or comment or any additional data, or any verification at all, and hence Mr. Edward's paper.